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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,624	03/15/2004	Tamer Kadous	030301	2928

23696 7590 03/26/2008

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EXAMINER	
OVEISSI, DAVID M	

ART UNIT	PAPER NUMBER
2616	

NOTIFICATION DATE	DELIVERY MODE
03/26/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/801,624	KADOUS, TAMER	
	Examiner	Art Unit	
	DAVID OVEISSI	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *May. 10, 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 5-7, 8, 10, and 12-13 are rejected under 35 U.S.C. 102 (b) as being anticipated by **Piirainen (US 7,031,419 B2).**

For claims 1, 10, and 13 **Piirainen** teaches a method/transmitter/apparatus of performing incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system *(see column 3 line2-27)*, comprising:

processing a data packet to obtain a plurality of symbol blocks for the data packet *(see abstract and column 2 lines 24-66)*;

transmitting a first symbol block from a plurality of transmit antennas at a transmitter to a plurality of receive antennas at a receiver, wherein the first symbol block is one of the plurality of symbol blocks *(see abstract Fig.3 "308a & 308b");* and

transmitting remaining ones of the plurality of symbol blocks, one symbol block at a time, until the data packet is recovered correctly by the receiver or all of the plurality of symbol blocks are transmitted *(see abstract and column3 2 lines 24-67)*.

For claim 5 **Piirainen** teaches a method, further comprising: receiving a negative acknowledgment (NAK); and transmitting a next symbol block among the remaining ones of the plurality of symbol blocks in response to receiving the NAK *(see Fig.4 "432 & 414)*.

For claim 6 **Piirainen** teaches a method, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM), and wherein each of the plurality of symbol blocks is transmitted from a plurality of subbands of the plurality of transmit antennas, if at all *(see Column 4 line 18-19)*.

For claim 8 **Piirainen** teaches a method, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM), and wherein each of the at least two symbol blocks for the at least two data packets is transmitted diagonally across a plurality of subbands and the plurality of transmit antennas *(see column 4 lines 18-19)*.

For claim12 **Piirainen** teaches a transmitter, further comprising:

a transmit spatial processor operative to receive a symbol block to be transmitted and provide symbols in the symbol block to the plurality of transmit antennas *(see column 10 lines 55-60)*. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-18, 21, 23-24, 26-29, and 31-38 are rejected under 35 U.S.C. 102 (e) as being anticipated by **Kim (US 20040114691 A1).**

For claims 15, 23, and 26 **Kim** teaches a method/receiver/apparatus of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

obtaining a block of detected symbols for a data packet, wherein the detected symbol block is an estimate of a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet *(see paragraphs 11, 12, 14, 16, 107, 108,110, 151, 216, 235, 260, and 261)*;

decoding all detected symbol blocks obtained for the data packet to provide a decoded packet *(see Fig. 11 "Post-Processor & detector", Fig. 12 "inverse Fourier Transformer & detector", Fig. 17 flowchart, and Fig. 31 Flowchart")*; determining whether the decoded packet is correct or in error *(see paragraphs 224 and 248)*; and

repeating the obtaining, decoding, and determining for another one of the plurality of data symbol blocks if the decoded packet is in error (see Fig. 7 flowchart , Fig. 10 flowchart *and paragraph 10*).

For claim16 **Kim** teaches a method, further comprising:

obtaining a block of received symbols for the data symbol block; and

detecting the received symbol block to obtain the detected symbol block *(see Fig. 10 flowchart and paragraph 10)*.

For claim17 **Kim** teaches a method, wherein the detecting is based on a minimum mean square error (MMSE) detector, a maximal ratio combining (MRC) detector, or a linear zero-forcing (ZF) detector *(see paragraphs 77, 224, 248, 227, and 251)*.

For claim18 **Kim** teaches a method, further comprising:

terminating the obtaining, decoding, and determining if the decoded packet is correct or if the plurality of data symbol blocks for the data packet have been transmitted *(see paragraphs 224 &248)*.

For claim 21 **Kim** teaches a method, wherein the selecting includes

deriving a signal-to-noise-and-interference ratio (SNR) estimate for each of the plurality of transmit antennas *(see paragraphs 224, 225, and 228)*,

determining an average spectral efficiency for the plurality of transmit antennas based on SNR estimates for the plurality of transmit antennas *(see paragraphs 224, and 225)*, and

determining the rate based on the average spectral efficiency for the plurality of transmit antennas *(see paragraphs 5 and 6)*.

For claim 24 **Kim** teaches a receiver further comprising:

a detector operative to obtain a block of received symbols for the data symbol block and to detect the received symbol block to obtain the detected symbol block *(see Fig. 30 "detector")*.

For claim 27 Kim teaches an apparatus, further comprising:

means for obtaining a block of received symbols for the data symbol block; and means for detecting the received symbol block to obtain the detected symbol block *(see Fig. 30 "detector")*.

For claims 28, 29, 33, 34, and 35 Kim teaches a method/receiver/apparatus of receiving an incremental redundancy (IR) transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

receiving a block of received symbols for a data packet, wherein the received symbol block is for a data symbol block transmitted from a plurality of transmit antennas at a transmitter and received by a plurality of receive antennas at a receiver, and wherein the data symbol block is one of a plurality of data symbol blocks generated for the data packet *(see paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 160, 216, 220, 235, and 239)*;

detecting all received symbol blocks received for the data packet to obtain detected symbol blocks, one detected symbol block for each received symbol block *(see paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 160, 216, 220, 235, and 239)*;

decoding the detected symbol blocks for the data packet to obtain decoder feedback information*(see paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 160, 216, 220, 235, and 239)*;

performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration*(see paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 160, 216, 220, 235, and 239)*; and

generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iterations*(see paragraphs 11, 12, 14, 16, 110, 114, 151, 155, 160, 216, 220, 235, and 239)*.

For claim 31 **Kim** teaches a method, wherein the detecting is based on a minimum mean square error (MMSE) detector, a maximal ratio combining (MRC)

detector, or a linear zero-forcing (ZF) detector ((*see paragraph 77).*

For claim 32 **Kim** teaches a method, wherein the MMSE detector is used for the detecting for N iterations and the MRC detector or the ZF detector is used for the detecting after N iterations, where N is one or greater*(see paragraph 77).*

For claim 36 **Kim** teaches an apparatus of claim 35, further comprising: means for determining whether the decoded packet is correct or in error; and means for repeating the receiving, detecting, decoding, performing, and generating for another one of the plurality of data symbol blocks if the decoded packet is in error and all of the plurality of data symbol blocks have not been transmitted *(see paragraphs 224 & 248).*

For claim 37 **Kim** teaches a method of receiving a data transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

detecting received symbols for a data packet to obtain detected symbols *(see paragraphs 11,12, 14, 16, 110, 114, 118, 137, 141, 151, 155, 160, 216, 235, and 239- estimated values are interpreted as feedback information, Pre-Processor & Symbol Extractor are interpreted as decoder)* ;

decoding the detected symbols to obtain decoder feedback information*(see paragraphs 11,12, 14, 16, 110, 114, 118, 137, 141, 151, 155, 160, 216, 235, and 239- estimated values are interpreted as feedback information, Pre-Processor & Symbol Extractor are interpreted as decoder)*;

performing the detecting and decoding for a plurality of iterations, wherein the decoder feedback information from the decoding for a current iteration is used by the detecting for a subsequent iteration, wherein the detecting is performed based on a minimum mean square error (MMSE) detector for first N iterations, where N is one or greater, and based on a maximal ratio combining (MRC) detector or a linear zero-forcing (ZF) detector for remaining ones of the plurality of iterations (see paragraphs 77, 224, 227, 247, and 251- MMSE, ZF, and N) ; and

generating a decoded packet based on an output from the decoding for a last iteration among the plurality of iterations*(see paragraphs 11,12, 14, 16, 110, 114, 118, 137, 141, 151, 155, 160, 216, 235, and 239- estimated values are interpreted as feedback information, Pre-Processor & Symbol Extractor are interpreted as decoder)*.

For claim 38 **Kim** teaches a method, wherein N is equal to one *(see paragraph 77)*.

Claim Rejections - 35 USC § 103

3. following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-4, 7, 9, 11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Piirainen** in view of **Walton et al. (20040136349 A1).**

For claim 2 **Piirainen** does not teach a method, further comprising:

obtaining a selected rate for data transmission on a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas, and wherein the data packet is processed in accordance with the selected rate**.** However, **Walton** from the same field of endeavor teaches this limitation *(see paragraphs 210, 211, and 219)***.** Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate different applications that require different transmission speed.

For claim 3 **Piirainen** does not teach a method, wherein the processing includes encoding the data packet in accordance with a coding scheme indicated by the selected rate to obtain a coded packet, partitioning the coded packet into a plurality of coded subpackets, and modulating the plurality of coded subpackets in accordance with a modulation scheme indicated by the selected rate to obtain the plurality of symbol blocks. However, **Walton** from the same field of endeavor teaches this limitation *(see Fig. 10 "Decoder Metrics & 30" and paragraph 219)* . Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to

accommodate different applications that require different transmission speed.

For claim 4 **Piirainen** does not teach a method, wherein the coding scheme is a Turbo code, and wherein the first symbol block includes systematic bits for the data packet. However, **Walton** from the same field of endeavor teaches this limitation *(see paragraphs 16 7and 174)*. Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate for various coding scheme.

For claim 7 **Piirainen** does not teach a method, wherein at least two data packets are each processed in accordance with the selected rate to obtain at least two pluralities of symbol blocks, one plurality of symbol blocks for each data packet, and wherein at least two symbol blocks for the at least two data packets are transmitted simultaneously from the plurality of transmit antennas to the plurality of receive antennas. However, **Walton** from the same field of endeavor teaches this limitation *(see Fig. 10 "Decoder Metrics & 30" and paragraph 9)* . Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate different applications that require different transmission speed.

For claim 9 **Piirainen** does not teach a method, wherein the MIMO system

utilizes orthogonal frequency division multiplexing (OFDM), wherein N_P data packets are each processed in accordance with the selected rate to obtain N_P pluralities of symbol blocks, one plurality of symbol blocks for each data packet, where N_P is equal to or greater than one and is selected based on a rank of the MIMO channel, and wherein N_P symbol blocks for the N_P data packets are transmitted simultaneously diagonally across a plurality of subbands and the plurality of transmit antennas. However, **Walton** from the same field of endeavor teaches this limitation *(see paragraphs 5 and 6)* . Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate different applications that require different transmission speed.

For claim11 **Piirainen** does not teach a transmitter, wherein the transmit data processor is operative to

encode the data packet in accordance with a coding scheme indicated by a selected rate to obtain a coded packet,

partition the coded packet into a plurality of coded subpackets, and

modulate the plurality of coded subpackets in accordance with a modulation scheme indicated by the selected rate to obtain the plurality of symbol blocks. However, **Walton** from the same field of endeavor teaches these limitations *(for first limitation , see epigraph 9 ; for second limitation see paragraph 26; for third limitation see paragraph 9)* . Thus, it would have been obvious to the person of ordinary skill in the art

at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate different applications that require different transmission speed.

For claim14 **Piirainen** does not teach an apparatus, wherein the means for processing includes

means for encoding the data packet in accordance with a coding scheme indicated by a selected rate to obtain a coded packet,

means for partitioning the coded packet into a plurality of coded subpackets *(see column 10 lines 45-48)*, and

means for modulating the plurality of coded subpackets in accordance with a modulation scheme indicated by the selected rate to obtain the plurality of symbol blocks. However, **Walton** from the same field of endeavor teaches these limitations *(for first limitation, see epigraph 9 ; for second limitation see paragraph 26; for third limitation see paragraphs 9 and 219)* . Thus, it would have been obvious to the person of ordinary skill in the art at the time of invention to use the rate selector of **Walton** in the MIMO system of **Piirainen.** The rational for this combination is to accommodate different applications that require different transmission speed.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kim** in view of **Piirainen (US 7,031,419 B2).**

For claim19 **Kim** does not teach a method, further comprising:

sending an acknowledgment (ACK) for the data symbol block if the decoded packet is correct or a negative acknowledgment (NAK) if the decoded packet is in error. However, **Piirainen** from the same field of endeavor teaches this limitation *(see F.4 flowchart "432 & 414").* Thus, it would have been obvious to person of ordinary skills in the art at the time of invention to use the MIMO system of Piirainen in the OFDM system of Kim. The rational for this combination is to provide feedback for retransmission.

5. Claims 20, 22, 25, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kim** in view of **Walton et al. (US 20040136349 A1).**

For claim 20 **Kim** does not teach a method, further comprising:

obtaining channel estimates for a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas; and

selecting, based on the channel estimates, a rate for data transmission on the MIMO channel. However, **Walton** from the same field of endeavor teaches these limitations. For limitation 1, see Fig. 3 "transmitter and receiver"; for second limitation, see 9 and 219. Thus, it would have been obvious to the person of ordinary skills in the art at the time of invention to use the MIMO system of **Walton** in the OFDM system of

Kim. The rational for this is to accommodate various applications that require different throughput.

For claim 22 **Kim** does not teach a method, wherein the selecting includes

deriving a signal-to-noise-and-interference ratio (SNR) estimate for each of the plurality of transmit antennas,

computing an average SNR based on SNR estimates for the plurality of transmit antennas,

determining a back-off factor, and

determining the rate based on the average SNR and the back-off factor. However, **Walton** from the same field of endeavor teaches these limitations *(see paragraph 219)*. Thus, it would have been obvious to the person of ordinary skills in the art at the time of invention to use the MIMO system of **Walton** in the OFDM system of **Kim**. The rational for this is to reduce congestion.

For claim 25 **Kim** does not teach a method a receiver, further comprising:

a channel estimator operative to obtain channel estimates for a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas; and

a rate selector operative to select, based on the channel estimates, a rate for data transmission on the MIMO channel. However, **Walton** from the same field of endeavor teaches these limitations. For limitation 1, see Fig. 3 "transmitter and receiver"; for second limitation, see 9 and 219. Thus, it would have been obvious to the

person of ordinary skills in the art at the time of invention to use the MIMO system of **Walton** in the OFDM system of **Kim**. The rational for this is to accommodate various applications that require different throughput.

For claim 30 **Kim** does not teach a method, further comprising:

obtaining channel estimates for a MIMO channel between the plurality of transmit antennas and the plurality of receive antennas; and

selecting, based on the channel estimates, a rate for data transmission on the MIMO channel. However, **Walton** from the same field of endeavor teaches these limitations. For limitation 1, see Fig. 3 "transmitter and receiver"; for second limitation, see 9 and 219. Thus, it would have been obvious to the person of ordinary skills in the art at the time of invention to use the MIMO system of **Walton** in the OFDM system of **Kim**. The rational for this is to accommodate various applications that require different throughput.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ketchum (US 6,731,668 B2), **Walton** et al. (US 2004/0081131 A1), and **Onggosanusi** et al. (US 7,133,459 B2) are all cited to show systems, which are considered pertinent to the claimed invention

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID OVEISSI, whose telephone number is (571)270-3127. The examiner can normally be reached on Monday to Friday 8:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Backer Firmin, can be reached on (571) 272-6703. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/FIRMIN BACKER/
Supervisory Patent Examiner, Art Unit 2616